Invertebrata

Tasmania's Invertebrate Newsletter

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Deadline

for the March *Invertebrata* is 23 February 2001

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Invertebrata is produced by the Queen Victoria Museum and Art Gallery, Launceston, Tasmania.

We publish articles and short notes on all aspects of invertebrate biology and conservation in Tasmania.

All correspondence (including changes of address) to the editor,
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Micro-molluscs

Molluscs are soft-bodied animals that usually live inside one or two protective shells and may be found in marine, freshwater or terrestrial habitats. While most are easily visible to the naked eye, about 600 species in Tasmania need a microscope for accurate identification and are known as micro-molluscs Of these, over 200 species never grow larger than a 2 mm pin-head.

By the end of the 19th century most of the larger species of Tasmanian shells had been described by famous conchologists such as Lamarck, Quoy and Gaimard, Angas, Reeve and many others. During the 1870s, the Reverend J.E. Tenison Woods published descriptions of many of the smaller shells. Unfortunately Tenison Woods had a bad habit of not indicating which of his mounted shells were the actual holotypes or paratypes (or cotypes, as they were known then). In the early 1900s, a group of four eminent Tasmanian conchologists was given the task of deciding which of these specimens were indeed the holotypes and 'cotypes.' One of these conchologists was W.L. May from Sandford, Tasmania. May described the majority of Tasmanian micro-molluscs between 1900-1924.

Most of the Tenison Woods and May collections of shells are lodged in the Tasmanian Museum. Later institutional and Tasmanian Museum staff additions have boosted the micro-mollusc collection to nearly 6000 registered samples, possibly the largest such collection in Australia. For protection and ease of handling, each sample is stored in a gelatin capsule, which is placed with its data label inside a small snap-top plastic bag.

Marine micro-molluscs may live in sponges, bryozoans or seaweeds, amid kelp holdfasts and between the byssal threads of mussels. When dead they can be found washed up in shell grit in rock pools, along the tide line and inside larger dead shells.

Under magnification, one can see the intricate and beautiful sculpture of micro-molluscs. Many are quite exquisitely delicate with patterns like icing-piping or criss-cross threads of growth lines. A microscope is always needed for identification as each tiny species has a different form and pattern.

At the Invertebrate Zoology Department of the Tasmanian Museum and Art Gallery, minute specimens are placed under the microscope lens and displayed by video link-up on a TV screen. The blown-up digital images can then be captured and stored in a computer for reference, databasing, or sending by e-mail to other places in the world. When specimens are requested on loan by a researcher, each specimen is imaged and the image stored in case of damage to the original while on loan.

Micro-molluscs are very easy to collect. All you need are a handful of fine shell grit from the tide line, a pair of fine tweezers, a microscope or magnifying glass — and loads of patience.

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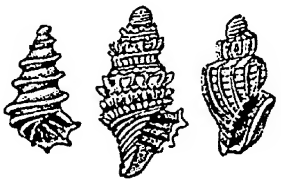

Editorial

In *Invertebrata 11* (July 1998) we lamented the plight of the Australian Biological Resources Study (ABRS), the Commonwealth-funded program which since 1973 has been the powerhouse of Australia's taxonomic effort. The Australian Research Council has supported molecular taxonomy, and other sources have funded studies with practical applications, but the ABRS has always directed its support to basic taxonomic research: the inventory of Australia's biota.

Funding for the program had substantially declined when Environment Australia commissioned Ray Walker and ANU's Professor Graham Farquhar to (among other things) make recommendations about the future of the ABRS. The Walker/Farquhar report was submitted to EA in January 1998. It noted:

> *At the current levels of funding the grants program will markedly slow down the rate at which the ABRS will be able to produce its major publication series. At the present rate of funding much of the unique Gondwana fauna will have disappeared before it is even described.*

Walker and Farquhar recommended that the ABRS taxonomic grants program should get $3 million annually, compared to $1.3 million in 1997/98, and that the publications program should also get $3 million per year. Environment Minister Robert Hill responded by announcing that the *total* ABRS allocation for 1998/99 would be $2.2 million, a 5% increase over 1997/98.

The allocation for 2000/01 is $3.4 million. On 13 September 2000, the Acting Director of the ABRS, Dr Geoff Dyne, wrote to the Society of Australian Systematic Biologists to advise on changes to the program. The most dramatic change is that the *Fauna of Australia* and *Zoological Catalogue of Australia* series will no longer be produced on paper. They will instead be available on the Web and in CD-ROM/DVD format.

ABRS also advised that its Advisory Committee would be expanded to include

> *representatives from the conservation movement, land-care, industry and community education. This is intended to bring a wider perspective to the Committee's work, with renewed focus on the practical application of taxonomic knowledge to environmental issues,*

and that

> *As part of its new business plan, ABRS will be seeking partnership opportunities and linkages with environment and other government programs, in order to extend its resources and accelerate its activities.*

The full text of the letter from the Acting Director is available on the SASB website:

www.science.uts.edu.au/sasb/Dyne.html

Letters to the Editor

I was interested to read Jennifer Rowlands' comments in *Invertebrata 17* regarding the identity of Henry Hellyer's cicada. I think she is correct in her diagnosis, as the sketch clearly shows two features that, in Tasmania, could only belong to the Hairy Cicada, *Tettigarcta tomentosa*. These are:

1. The small head with relatively large, close-set compound eyes, and
2. the large pronotum with lateral spine-like tooth.

The other species of Hairy Cicada (*Tettigarcta crinita*), from the mainland, has a similar head, but no lateral pronotal spine and the only other genus with a similarly shaped head, *Lembeja*, occurs in north Queensland (although it has a 'normal' shaped pronotum). Plate 6 of Max Moulds' *Australian Cicadas* clearly shows these species and the above-noted species.

Incidentally the illustration of *T. tomentosa* from the CSIRO book is wrongly attributed to Geoff Monteith — it was actually his wife Sybil who did the drawing in *The Insects of Australia*. Unfortunately the scanned illustration is of a lateral view, and does not show the two features noted above.

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More information:

Moulds, M. 1990. *Australian Cicadas*. Kensington (NSW): New South Wales University Press.

Is your editorial [March 2000] saying "Hey great stuff - you have appointed an invertebrate expert to be part of producing a really important nature conservation document - and you're asking us to be involved" - or is it the same old boring, out of context, cynical and personally derogatory editorial that makes this tired old long-serving Parks officer want to say "Just give *Invertebrata* a miss". Thank goodness pursuing the cause of invertebrate conservation goes well beyond your personal opinion.

Dr Sally Bryant
Biodiversity Unit
DPIWE

[*The above was received in early May. On 9 May I replied to Dr Bryant as follows:*

> To answer your question, the last paragraph of the *Invertebrata* editorial sums up its message. TNCS offers an opportunity for your agency to abandon the informal policies evidenced in what I've noted: the 12/99 email [*sender named*], the wildlife website and the quote from the long-serving Parks officer. 'It would be nice' and 'we can only hope'.
>
> What the 200+ readers of *Invertebrata* would like to see is a TNCS that promotes effective (not default) conservation of 'the most diverse, the least well-known and the least well-conserved sections of our fauna'. The Biodiversity Unit is staffed by two professional zoologists. I'm confident they know what's required. You quite appropriately ask *Invertebrata* readers for contributions, but the TNCS process cannot be a ballot. If bird-focused submissions vastly outnumber earthworm-focused submissions, it would be simply appalling if the Biodiversity Unit took this as support for a Strategy which, like current fauna conservation practices, cherishes birds and ignores earthworms.
>
> The ball is in your court. *Invertebrata* will be happy to publish whatever preliminary proposals you produce, for comment by the readership. (Incidentally, the next two editorials have nothing to do with Parks or TNCS.) The soft deadline for the July issue is Friday, 23 June.

As of 27 October, we had received nothing further from the Biodiversity Unit for publication in Invertebrata. *— Ed.*]

Hunting for *Anaspides* eggs

Anaspides tasmaniae, the Tasmanian mountain shrimp, is renowned for having retained many primitive features. There is a wealth of work on its morphology, but there are few investigations of its life-cycle. There is a single paper on early development published in 1936 by V. V. Hickman, who later became Professor of Zoology at the University of Tasmania in Hobart. His paper not only covers embryology from egg-laying to hatching but gives details on post-embryonic stages. The information is concise and very reliable.

The study of early development in arthropods has gained new momentum from the discovery and characterisation of many genes affecting segmentation. Some of these genes are restricted to a small group of species, others are found in nearly unaltered form in other arthropod classes. In order to put these findings in an evolutionary and phylogenetic framework the German Science Foundation (Deutsche Forschungsgemeinschaft) has launched a research program with the theme 'Evolution of Developmental Mechanisms'. Several malacostracan crustaceans have already been investigated in this context, for instance representatives of the crayfish, woodlice, beach-hoppers and krill groups.

My colleague, Prof. Gerhard Scholtz (Humboldt University, Berlin) and I decided to make an effort to include the mysterious *Anaspides* in these investigations. We stayed four months in Tasmania: Gerhard Scholtz during December 1999 and I from January through March 2000. We enjoyed the hospitality of Prof. Roy Swain, the outstanding expert in *Anaspides* research, and of Prof. Alastair Richardson, both of the School of Zoology, University of Tasmania, Hobart. We chose as sampling sites New Town Rivulet (which had been sampled by Prof. Hickman), Collinsvale and Ladies Tarn in the Hartz Mountains.

It is by no means easy to get *Anaspides* eggs. Keeping animals in aquaria and inducing egg-laying seems unfeasible. Specimens were therefore kept in plastic containers in their natural habitat. They laid eggs in small crevices in the containers. One container was washed away during torrential rain in January. This was a disaster which Hickman had also experienced several times. Wooden boxes which had been expertly built at the School of Zoology were put into the creeks, but these unfortunately warped so that the animals escaped before having been completely acclimatised. Prof. Swain suggested a new device which may attract females ready to lay. One prototype has already been exposed in a creek. We hope that it may yield better results and allows us to make a more thorough investigation. Once having been laid and having developed to gastrulation, the eggs seem to be less delicate: I took some eggs with me to Germany where they developed further. Some have been fixed for microscopic study. Three embryos are still alive. jerking their antennae, after more than seven months of development.

I will not pass in silence over the fact that we enjoyed the hospitality and hearty welcome of several people in Tasmania. Apart from our frequent walks to the sampling sites we took the opportunity to make excursions into several parts of the country. One of them led me to the north where we were guided by the editor of this Newsletter, Bob Mesibov, who had hunted for me another jewel of the Tasmanian fauna, the centipede *Craterostigmus tasmanianus*, which I also kept alive for some time.

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[The following poem was unearthed by Queen Victoria Museum librarian Kaye Dimmack. The identity of the poet is unknown. With apologies to Henry Wadsworth Longfellow ('Excelsior') and Profs. Dohle and Swain, we present…]

Anaspides!

The shades of night were falling fast,
As through a Mountain Village passed,
A youth who wobbled from the hips,
A valiant cry upon his lips-
'Anaspides!'

His face was gaunt, his eyes were set
His fevered brow was fringed with sweat,
But as he pushed through dale and glen
This word was muttered o'er again-
'Anaspides!'

His pace grew slack, his feet like lead
Dragged behind him sore and red.
Through forests tall and mountains bleak,
His voice still mumbled faint and weak-
'Anaspides!'

He struggled on, his head went round,
Till last he stumbled to the ground,
And lying there beside a creek,
He let forth one tremendous shriek-
'Anaspides!'

For swimming round in twos and threes,
Were shrimps with ancient pedigrees,
And then his voice to song gave vent,
Exulting to his heart content-
'Anaspides!'

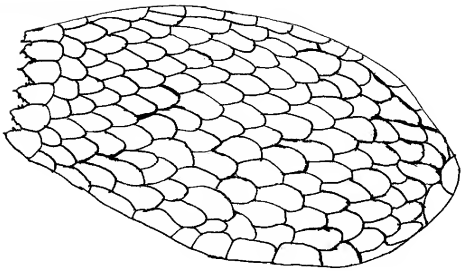
Then springing up with life anew,
He filled his boots and trousers too.
And as he stuffed the last one in,
He chuckled with a cheerful grin-
'Anaspides!'

At last he reached the Museum door,
The crowds were gathered by the score,
A tear rolled from his starboard eye,
When to a man he heard them cry-
'Anaspides!'

The drums rolled out, the trumpets blared,
They really had our hero scared.
For when they asked the youth to speak
The crowd heard just one tiny squeak-
'Anaspides!'

Then praising this inspiring feat,
The Mayor asked what he'd had to eat,
His grip on life was failing fast:
He answered as he breathed his last-
'Anaspides!'

What is it?



Is it even an invertebrate, or something else? Three specimens of this strange pineapple-shaped beast were found inside the umbilicus of a minute Tasmanian snail, *Pasmaditta jungermanniae*. The snail is 2 mm wide, the beast itself is about 65 microns. The six prongs on the front each appear to have up to five sharp points which may hold onto the snail shell. If you know what it is, please contact Kevin Bonham (k_bonham@postoffice.utas.edu.au). An SEM picture is available in electronic form.

QVMAG Mollusc Happenings

The last four months have seen a few interesting happenings in Malacology at the Queen Victoria Museum. For family reasons I have moved to Victoria to live but I will be returning to Launceston about every six weeks for a week at a time to continue the curation of the mollusc and echinoderm collections and do identifications and related inputs. I can still be reached via the Museum (emails to me at the address below are automatically forwarded to me at home) or I can be reached with **brisnail@bigpond.com**

Recently we acquired six S38 steel cabinets from the Museum of Victoria which have allowed a significant expansion of the dry mollusc collections. Over the next six months the dry collections will be reorganised. on the basis of the new checklist of molluscs for Tasmania, to be published (hopefully) early next year. The new cabinets will ease overcrowding in some areas of the collection and will permit reorganisation and expansion of the echinoderm collection. A significant, largely non-Australian, non-marine mollusc donation is to be added to the collection in November. This will be especially useful in the identification of introduced molluscs brought in by Quarantine.

I will continue looking at snails from the Warra LTER sites in the Southern Forests, with a field trip planned for mid-November. In mid-October several Museum staff went on a preliminary evaluation trip to Wilandra, a large sheep property northeast of Broken Hill, NSW to assess the suitability of the venue for a study centre for the Friends of the QVM. I went along and made a small, but interesting, collection of molluscs.

Once I am properly re-established in Bendigo I hope to do more mollusc work at the QVM.

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(continued from page 10)

At universities, the key to reversing the situation lies in hiring (and eventually granting tenure to) scientists with an abiding affection for natural history. Unfortunately, a Catch-22 applies here. Administrators and senior professors who are uninterested in or even hostile to natural history are not likely to value it when judging candidates for junior faculty positions. And without access to entry-level positions, a new generation of natural historians will never emerge to become tomorrow's administrators and senior faculty members. The institutions that pay for research, however, could assume a leadership role in rescuing natural history. Were more money available for basic natural-history studies, we are convinced that more graduate students and faculty members would incorporate natural history into their researching and teaching.

An even more fundamental step would be to reinstate natural-history studies in elementary and secondary schools. Most children are fascinated by plants and animals -- from dandelions to dinosaurs. That seemingly innate interest, if nurtured by adults, can become a lifelong joy or even the path to a career. Untended, it usually atrophies as a child grows older. For the price of a stereo microscope, now less than $250, a science teacher can turn a pinch of soil into a bustling world of springtails, oribatid mites, and nematodes, creatures as bizarre and engaging as anything to appear in a Star Wars movie. The current push to connect every classroom in America to the Internet demonstrates how quickly elected leaders and the public can be galvanized to address what is rightly perceived to be a critical educational need.

Meanwhile, the demise of natural history goes unnoticed, increasing the likelihood that future generations of schoolchildren will spend even more time indoors, clicking away on their plastic mice, happily viewing images of the very plants and animals they could be finding in the woods, streams, and meadows they no longer visit.

David S. Wilcove is senior ecologist at Environmental Defense.

Thomas Eisner is Schurman Professor of Chemical Ecology at Cornell University

From *The Chronicle of Higher Education*; distributed through **ozentomology** (see p. 9)

Spring emergence dates for cabbage white butterfly in Tasmania

I wonder whether the two caterpillar pests of brassica crops, diamondback moth *Plutella xylostella* (Linnaeus) and cabbage white butterfly *Pieris rapae* (Linnaeus), have their local populations regularly or irregularly reinforced by migrants from the mainland. An interest in the immigration of several agricultural pests in the moth family Noctuidae predisposed me to this notion.

Cabbage white butterfly is capable of substantial migrations (Common & Waterhouse 1972). Evans (1940) suggested that their first appearance in Tasmania on 1 January 1940 at Stanley was the result of immigration across Bass Strait from Victoria not long after they first appeared in Australia. The sudden appearance of a large flight of a novel white butterfly in Tasmania around 1940 was corroborated to the author by horticulturalist Bruce Beattie (pers. comm.). He recounted a report by his father of sudden large flights of the novel white butterfly near Scottsdale. However, confusion may occur with the superficially similar pierine butterfly, the caper white *Belenois java teutonia* (Fabricius), which appears in occasional years as a vagrant in Tasmania (Common & Waterhouse 1972, Reid 2000).

The cabbage white butterfly, the painted lady *Vanessa cardui* (Linnaeus), the admiral *V. itea* (Fabricius) and, to a lesser extent, the meadow argus *Juniona villida calybe* (Godart) often appear around September concurrently with known moth migrants such as native budworm *Helicoverpa punctigera* (Wallengren), bogong moth *Agrotis infusa* (Boisduval) and southern armyworm *Persectania ewingii* (Westwood) (Hill, unpublished data). Although the painted lady and meadow argus overwinter in Tasmania they are capable of oceanic migration (Common & Waterhouse 1972), making the source of their early appearances uncertain.

For cabbage white butterfly at Devonport, I compared dates of emergence of overwintered pupae with dates of first sightings of adults to test whether first sightings and known local emergences differed substantially. Pupae were observed settling naturally on a north-facing brick wall adjacent to a small cabbage patch in three years, 1992-94. The fates of these pupae are shown in Table 1. Many of the overwintering pupae were parasitised by the tiny wasp *Pteromalus puparum* (Linnaeus) at the beginning of winter and yielded wasps rather than butterflies in spring.

The dates and abundance of early sightings of cabbage white butterfly around Devonport were noted for 10 years, 1991-2000. In all years, the first sightings were closely followed by increasingly frequent sightings. First sighting dates of feral cabbage white butterflies around Devonport (assumed not to have originated from the former) and emergence dates of overwintered pupae are listed in Table 2. Mean emergence date for 1992, 1993 and 1994 was calculated as the arithmetic mean of the calendar days (ignoring leap year) on which the six pupae in each year emerged. The overall mean emergence date for the 18 pupae in 1992-94 was 29 September, compared with 3 October as the mean for first sightings in those three years. (The mean first sighting date for the 10 years 1991-2000 was 25 September.)

The results do not indicate that cabbage white butterfly appears on the wing each spring long before the emergence of pupae that over-wintered locally in a relatively warm situation.

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More information:

Common, I.F.B. and Waterhouse, D.F. 1972. *Butterflies of Australia*. Sydney: Angus & Robertson.

Evans, J.W. 1940. The Cabbage Butterfly. *The Tasmanian Journal of Agriculture* 11: 202-204.

Reid, C. 2000. QVM Capers. *Invertebrata* 16: 4

Table 1. Fate of cabbage white butterfly pupae overwintering at Devonport.

Outcome (%)	1992	1993	1994
P. rapae adults emerged	13.6	66.7	20
Pteromalus families emerged	72.7	11.1	45.7
Died from disease	0	0	5.7
Pecked or missing	13.6	22.2	2.9
Destroyed by accident	0	0	8.6
Unresolved late emergence	0	0	17.1
Total	100	100	100
Number of pupae	44	9	35

Table 2. Dates of first sightings and local emergences of cabbage white butterfly at Devonport.

Year	First sighting	Local emergence
1991	10 September	
1992	1 October	9 September-18 November (mean 17 October, n = 6)
1993	22 September	28 September - 10 October (mean 30 September, n = 6)
1994	16 October	26 August - 9 October (mean 11 September, n = 6)
1995	9 September	
1996	21 September	
1997	17 October	
1998	28 September	
1999	15 September	

The trouble with *Astacopsis*

The giant crayfish Astacopsis gouldi *is Tasmania's largest freshwater invertebrate and one of our best-known conservation icons. It is listed as 'vulnerable' under both the State* Threatened Species Protection Act 1995 *and the Commonwealth* Endangered Species Protection Act 1992. *In* Invertebrata 16 *(March 2000), Dr Jean Jackson of the Inland Fisheries Service reviewed progress in the conservation of* A. gouldi *and outlined the latest draft Recovery Plan. The draft is not having an easy passage towards implementation, as indicated below. The first article is by Bill Thomas, a community member of the Recovery Team which developed the latest Plan. The second article is a reply from Warwick Nash of the Inland Fisheries Service. Independent of the Plan, Todd Walsh of Smithton is continuing his admirable efforts to educate the community on the importance of* A. gouldi *conservation, and the total ban on* A. gouldi *fishing (in place since January 1998) continues, although some poaching has been reported.*

The last meeting of the *Astacopsis* Recovery Team was on 26 May 2000. This meeting was called by the Chair of the Recovery Team, Warwick Nash (Deputy Director, Inland Fisheries), in response to objections by Penny Wells (Forestry Tasmania) to wording of the Plan produced by the former chair Jean Jackson (Inland Fisheries). When I questioned Warwick Nash as to the need to have this meeting rather than continue with the Plan as it stood, which was clearly an option (Inland Fisheries being the lead agency in the recovery of this species), I was told that if we didn't voluntarily have a meeting to resolve this issue the Minister would direct us to have a meeting.

The meeting on the 26th was long and laboured, to do with specific wording in the 'Strategies and 'Recovery Actions sections of the Plan. Essentially it was resolved that in the Strategies section of the Plan the particular wording would be: *'This indicates to the Recovery Team that buffer strips of at least 30 m may be required on each side of class 2, 3 and 4 streams where* A. gouldi *is known to occur locally or immediately downstream to minimise the impacts on* A. gouldi *during and after logging operations'.* The wording *'may be required'* was accepted by all present for this section of the plan. There is no definitive scientific work specifically dealing with a combination of buffer strips on small streams (classes 3 and 4) and *Astacopsis*, however there is clear evidence in the Tasmanian situation that buffers less than 30m on larger streams (class 2) do in fact impact on instream biota, and researchers have found juvenile *Astacopsis* in class 4 streams.

The wording of the Recovery Actions section of the Plan dealt with on 26th May was *'As discussed the Recovery Team considers that buffer strips of at least 30 m should be implemented on each side of class 2, 3 and 4 streams where* A. gouldi *is know to occur locally or within 2 km downstream, to minimise impacts on* A. gouldi *during and after logging operations'.* This was endorsed by all members of the Recovery Team except for the Forestry Tasmania representative, who objected to the wording *'should be implemented'.* The objection was on the basis that there was no supporting evidence and the wording was prescriptive. The argument supporting the majority view was that the Recovery Team had a duty to recommend measures for protection of the species.

I believe the Recovery Team wanted to make it clear that until scientific evidence proved otherwise, this is what the Team thought was necessary, or likely to be necessary, to protect *A. gouldi* in forested areas. Informing this decision were the following factors laid out to the Recovery Team members over the last four years:

- the species is listed as threatened,
- the species is a priority forest dwelling species under the 1997 Tasmanian RFA,
- there is a clear perception the species is in decline and has been for a long time,
- habitat disturbance is clearly one of the causal agents of this decline, and production forests within the range of the lobster contain some of the best remaining habitat,
- attempts to protect the species through reservation to date have been unsuccessful,
- available evidence suggests that additional protection to that currently prescribed in the Forest Practices Code is required,
- there is a requirement to be precautionary when there is a lack of scientific understanding of exactly the effects of the causal factors as is the case with this species.

The Recovery Team was respectful of the dissenting view of the Forestry Tasmania representative and accordingly agreed to append the statement that not all Recovery Team members agreed to specific wording in the Actions Section of the Plan.

The Director of The Department of Primary Industry, Water and Environment has now put the Recovery Plan out for public comment (closing on 27 October 2000). To the utter consternation of some team members the Director has both removed the footnote and overturned the Team's recommendation in the Recovery Actions section of the Plan. The wording in the Recovery Actions section is now *'As discussed the Recovery Team considers that buffer strips of at least 30 m may be required on each side of some class 3 and 4 streams where* A. gouldi *is known to occur locally or within 2 km downstream, to minimise impacts on* A. gouldi *during and after logging operations'.* The Director has misrepresented the majority view of the Team and coincidentally worded the Plan much as sought by Forestry Tasmania.

The change of wording from *'should be implemented'* to *'may be required'* in the Actions Section may seem slight, but in one stroke of the pen the Plan becomes completely discretionary. This discretionary wording takes much of the pressure off land managers to justify their destruction of riparian habitat on headwater streams where *Astacopsis* is known to occur. It is now arguable that The Giant Freshwater Lobster Recovery Plan is more of a Research Plan than a Recovery Plan. As part of the 1997 Regional Forest Agreement, the Giant Freshwater Lobster Recovery Plan is also required to be adopted at a Commonwealth level. For Commonwealth adoption a Recovery Plan needs to *'specify the actions needed to satisfy the recovery criteria, identify and specify the actions needed to protect the habitats that are critical to the survival of the species or community,'* according to Recovery Plan Guidelines released by A.N.C.A. in 1995.

As if to give extra credibility to the Draft Plan being put out for public comment, DPIWE states that this Plan *'is a revised and updated version of the 1997 Plan prepared and submitted to the*

Commonwealth' under the Regional Forest Agreement. Whilst acknowledging receiving copies of the original 1997 Plan, Environment Australia and the Minister for Environment and Heritage, Senator Hill, both deny that the Plan was ever formally submitted. The fact is that the Plan languished for almost two years in the offices of the Parks and Wildlife Service, supposedly because it was thought the budget estimates were too high and one of the actions (cessation of recreational fishing) needed rewriting.

As a community member involved with the Recovery Team since February 1997, I must say that it has been a most frustrating experience. Worse is that the government agencies involved don't seem to know or understand the various Acts and Agreements that deal with this species, the process for developing Recovery Plans seems unclear to all, and the Recovery Plan Guidelines appear not to be followed. Concern about this species has been expressed for quite a number of years now. The forestry industry has always been quick to be defensive, but never quick to objectively assess impacts or protective measures to do with this species. New research projects will yield more definitive answers. I would only hope that other Recovery Plans in this State are not dealt with in a similar manner.

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Bill Thomas raises some important issues in relation to the preparation of the draft *Astacopsis* Recovery Plan. I would like to address these and other issues.

When preparing a recovery plan for a threatened species, a major challenge arises when making conservation recommendations that are based on incomplete knowledge. Organisations and individuals who bear the responsibility for sustainable resource utilisation are nominally supported by the Precautionary Principle which states: *'Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'* (Rio Declaration on Environment and Development 1992). In practice, however, economic and social factors as well as ecological ones are often taken into consideration when the Precautionary Principle is applied. This is the case in Tasmania. The practical consequence of this is that, when the economic or social impacts of a particular precautionary measure are likely to be large, the evidence that such an action is necessary needs to be compelling for it to be incorporated into legislation or policy.

This is the case with the *Astacopsis* Recovery Plan. An increase in width of streamside buffers on Class 4 streams to 30 metres would have severe economic consequences for the Tasmanian forestry industry, particularly in some of the wetter areas where Class 4 streams are very numerous, because it would effectively exclude logging from such areas. As a result, the pieces of evidence presented in the draft *Astacopsis* Recovery Plan, as prepared by the *Astacopsis* Recovery Team, that are used to argue that streamside buffers alongside Class 4 streams should be increased to 30 metres are regarded by some as being too tenuous to justify such a recommendation.

This is because it is not known whether Class 4 streams are important for *Astacopsis gouldi*. The fact that researchers have found juvenile *Astacopsis* in Class 4 streams does not answer the question. Class 4 streams *may* be important, but it will take more than observational records to show it. If only a small proportion of *Astacopsis* populations inhabit Class 4 streams, and if downstream impact through runoff of sediment, pesticides and nutrients is limited, then degradation of these streams by forestry practices may not be a significant threat.

It is the role of a threatened species recovery team to provide its best advice on strategies to mitigate the threats to the species, based on available knowledge. This the *Astacopsis* Recovery Team did when it submitted the draft Recovery Plan to the Parks & Wildlife Service. Changes that were then made to the wording in relation to 30-metre buffers, as described by Mr Thomas, resulted from a weighing of economic and environmental considerations. In the draft Recovery Plan, these changes were wrongly attributed to the Recovery Team. In recognition of this, a corrected version of the draft Plan will be issued by Parks & Wildlife in the very near future, and public comment on this draft will be re-invited.

In order to address the recovery actions listed in the draft Recovery Plan, it is of highest importance to design well-focused studies that address the issues, and to obtain sufficient funds and resources to carry out these studies. Given the rate at which Tasmanian native forests are being converted to plantation, there is an urgent need to obtain funding and initiate these studies as soon as possible. It is also important that these studies fit into a larger framework that addresses Class 4 issues generally (not just *Astacopsis*). A Class 4 Research Steering Committee, comprising representatives from forestry, the Forest Practices Board, private forestry experts and the Inland Fisheries Service has recently been set up to develop key projects. Initial steps have been taken to develop a Ph.D. project on *Astacopsis* that addresses the main research issues listed in the Recovery Plan. It is hoped that this study will commence early next year.

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Apologies to our readers

If you sense that a certain amount of padding has been done to fill out this issue, you're right. Page 10 and a few other places had been held for promised contributions which didn't arrive before our deadline, despite repeated and increasingly urgent reminders. We hope you enjoy the substitute, an excellent article by two American biologists.

If you also sense that more invertebrate research is done in Tasmania than is noticed in this newsletter, you're right again. There are some excellent studies being undertaken in this State whose results would be of great interest to *Invertebrata* readers. We have appealed to the researchers involved for news from their projects, but with very limited success.

I'm afraid to say that in both cases the missing elements are from the University of Tasmania. In the March *Invertebrata* we hope to present a list of invertebrate research projects at the University and email contacts for the project supervisors. The fauna concerned are marine, freshwater and terrestrial. A listing of this kind won't be as informative as contributions from the researchers, but it will help you make inquiries.

Invertebrates in the media

Protecting Buttongrass Moorland

The Federal and State Governments have purchased a remnant of buttongrass moorland, rare in north-west Tasmania, to ensure its protection for future generations.

Announcing the purchase, Federal Environment Minister, Senator Robert Hill, and Tasmanian Environment Minister, David Llewellyn, said extensive clearance, land draining and grazing pressure from agriculture meant that little of this native vegetation remained.

As well, very few large areas are protected in reserves in this region.

'The purchase of an 880 hectare property, known as 17-Mile Plain, near West Montagu in Tasmania's Woolnorth region, is an opportunity to ensure the survival of this vegetation type, which is becoming increasingly rare in the region,' said Senator Hill.

'The property contains five buttongrass moorland communities which are poorly reserved in protected areas and together with the surrounding forests are the habitat of two listed threatened bird species; the Wedge-tailed Eagle and Grey Goshawk.

'The site is also important habitat for the Ground Parrot, the plant species Trachymene anisocarpa *and several significant invertebrate species, including the Keeled Snail, which is rare in Tasmania,' he said.*

Mr Llewellyn said the purchase was an important addition to the State's suite of preserved areas.

'Buttongrass plays a valuable role in Tasmania's natural ecosystems. Only recently are we developing a better understanding and greater appreciation of the role that buttongrass plays in our ecology.

'As just one example, buttongrass provides a vital habitat for the endangered Orange Bellied Parrot.

'We are fortunate to have recognised the value of these areas before it became too late to ensure their preservation for the future.'

The purchase of the private land was funded through the Commonwealth National Reserve System Program of the Natural Heritage Trust which provided $246,667.

*The property will be absorbed into a 1120 hectare conservation reserve to be created under the National Parks and Wildlife Act. The reserve will protect an important Rocka Rivulet Gum (*Eucalyptus brookeriana*) forest community. The combined reserves will form a large natural ecosystem reserve with a mix of important native habitat.*

The National Reserve System program aims to establish a comprehensive, adequate and representative system of reserves to protect the many different types of habitat across Australia.

— State Government media release, 5 October 2000

The proposed 2000 ha reserve occupies the southeast corner of 'Woolnorth', which was established by the Van Diemens Land Company in 1826 as one of its pastoral properties in northwest Tasmania. Throughout its 170-year history the VDL Company has pursued a very conservative development policy. It has always put its development capital into pasture and stock improvement, and has never seriously exploited its private timber resource for other than on-farm needs. The only substantial return to the VDL Company from its forests has been from the sale of forested land.

In 1936 the heavily forested eastern portion of 'Woolnorth' was bought by Associated Pulp and Paper Mills. For many years thereafter APPM's pulp mill at Burnie was supplied with 'billet wood' (3-foot 6-inch pieces of split eucalypt) from the company's 'Woolnorth' forest. In more recent times the landowner (now North Forest Products) has cleared a large area of native eucalypt forest at its 'Woolnorth' property and converted it to *Eucalyptus nitens* plantation. The proposed Seventeen Mile Plain reserve has the Montagu River as its eastern boundary and *E. nitens* plantations to its north and west.

The southern boundary of the proposed reserve adjoins the 1795 ha Bond Tier Forest Reserve, proclaimed in 1996 and managed by Forestry Tasmania. Whereas Seventeen Mile Plain is largely low-lying moorland, heathland and short wet forest, Bond Tier FR is mainly tall wet forest on elevated ground. The whole of Bond Tier was selectively logged by sawmillers in the first three-quarters of the 20th century, and most of its reserved forest is regrowth.

Invertebrata contacted Minister Llewellyn's office for the names of the 'several significant invertebrate species' at Seventeen Mile Plain, but no information was available.

The Keeled Snail, *Tasmaphena lamproides*, has been the subject of repeated surveys by Kevin Bonham (see references, p. 9), and Bond Tier FR is currently the largest populated reserve within its Tasmanian range. The species also occurs in far southern Victoria and on Three Hummock Island off Tasmania's far northwestern tip. On mainland Tasmania *T. lamproides* ranges from the Woolnorth Point area (K. Bonham, *pers. comm.* 7 September 2000) eastwards to the Nut at Stanley, and southwards to the junction of the Arthur and Frankland Rivers. It has a centre of abundance in the dense wet eucalypt forests of Bond Tier, Christmas Hills and areas to the south, with scattered colonies elsewhere.

The inland range boundary of *T. lamproides* is interesting. Bonham notes that this portion of the boundary lies largely along the slopes of ridges taller (200+ m) than those elsewhere in its mainland range. Have these ridges acted as a dispersal barrier for the snail?

The range boundary in question seems to agree fairly closely (see map, p. 9) with that of the common western millipede *Reginaterreuma tarkinensis*. Further fine-scale mapping of invertebrates in this area may show that the *T. lamproides* range terminates in a faunal break: a narrow landscape zone across which the invertebrate fauna changes abruptly.

(continued p. 9)

More information:

Bonham, K.J. 1992. Tasmaphena lamproides *(Cox, 1868) in the Togari Forest Block.* Unpublished report to Forestry Tasmania.

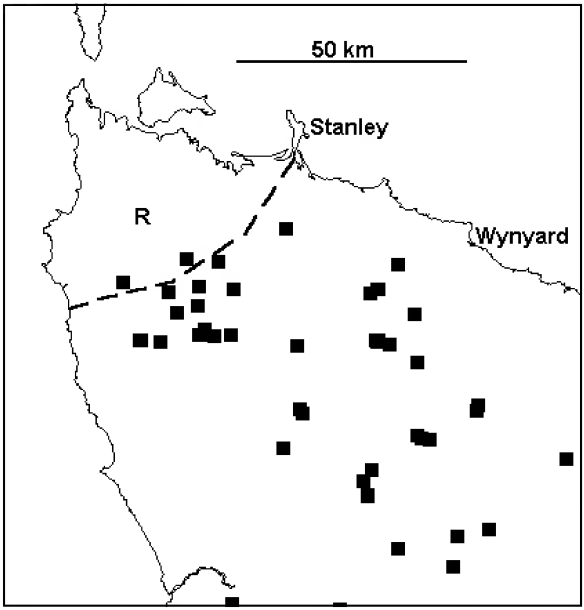
Bonham, K.J. 1997. Native land snails of King Island and the Hunter Group. *The Tasmanian Naturalist* 119: 10-22.

Bonham, K.J. and Taylor, R.J. 1997. Distribution and habitat of the land snail *Tasmaphena lamproides* (Pulmonata: Rhytididae) in Tasmania. *Molluscan Research* 18: 1-10.

Bonham, K.J. 1999a. Distribution, habitat and conservation status of the land snail *Miselaoma weldii* (Pulmonata: Punctidae). *The Tasmanian Naturalist* 121: 2-12.

Bonham, K.J. 1999b. *Range Boundary Survey for the Keeled Snail* Tasmaphena lamproides. Unpublished report to Forestry Tasmania.

The map below shows the approximate inland range boundary of *T. lamproides* (dashed line) and the location of the proposed Seventeen Mile Plain reserve ('R'). Black squares are localities for the chordeumatidan millipede *Reginaterreuma tarkinensis* Shear and Mesibov, 1995.



Ozentomology

The new Internet discussion group 'ozentomology' is open to anyone who has an interest in antipodean entomology. It is a list for news, comment, notices and job advertisements. It currently exists in two slightly different forms, ozentomology and ozentomology-digest, the only difference between the two being that the digest is sent out only once a day whereas messages on the other list are sent out as they are received. All messages get sent to both lists. If you wish to subscribe, please send an email to **majordomo@pobox.une.edu.au** with the line 'subscribe ozentomology' or 'subscribe ozentomology-digest' in the body of the message (no subject line, no signature file).

To List or Not to List

Some taxonomists compile lists of known species. Other taxonomists feel that the need to document our fauna is so urgent that anyone with the requisite training who is not describing one new species a week, is committing a cardinal sin. The latter say, *'Don't waste your time with anything but describing the fauna. Do real science, not those lists.'*

I am a lister. Someone has to do it, and if that is true, it should be someone 'in the field' who knows the fauna, the literature and all the rules. Faunal lists, regional checklists, generic keys, field guides, distributional atlases etc. are all useful tools for spreading the word; that is, for putting the results of primary taxonomical research into a form that non-taxonomists can use. Listers can also be catalysts for winning new people into doing taxonomy. In any case, all taxonomists do it; making a list of the taxa in the group you are revising is a necessary process in taxonomy. But listers make lists to be published in their own right, too.

A checklist of the molluscs (marine and non-marine) of Tasmania was started by Ron Kershaw of Launceston a few years ago. This was a revision of his 1956 list, which in turn was based on May's 1923 illustrated guide. Ron passed the unfinished list across to me to complete and I decided to hold off from publishing until the *Fauna of Australia* volume on Mollusca appeared, as this would then become the definitive reference for all work on Australian molluscs. This volume is now available, so we are pressing ahead to complete the Tasmanian list. Hopefully it should be finished fairly early next year, and will be published by the Queen Victoria Museum.

The new checklist will lift out all the Tasmanian references in the *Fauna of Australia* volume and will be an up-to-date working reference to our molluscan fauna, as a base-line for a wide range of uses both within the State and across the world. Tasmania is a vital locality in world zoogeographic studies, so our checklist will contribute to global biogeographic work as well.

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The impending extinction of natural history

By David S. Wilcove and Thomas Eisner

Imagine you are a naturalist with a liking for insects. You are interested in how insects make a living, in how they are fit for survival. You marvel at how protected they are as adults, when they are able to fly. And you think of how helpless they are as eggs and pupae, when they are stuck in place, unable to take evasive action. True, pupae are sometimes enclosed in protective cocoons, or hidden in dugouts in the soil, but some live out in the open, where they are exposed to a world of predators.

How, for instance, do the pupae of ladybird beetles (family Coccinellidae) manage to survive? They are typically affixed to stems or leaves, where one would imagine they don't stand a chance against ants. Might they have special weaponry? You look closely and find that they do. They have what are essentially biting devices, in the form of clefts along the backs of their abdomens that they can open and close and use to snap at ants that come too close.

As a naturalist with a Darwinian bent, you wonder whether such snapping devices are present in every ladybird-beetle pupa or whether, in the best evolutionary tradition, different ladybird species have come to possess variants of this defense. You look at different species and find that, yes indeed, the beetles of one genus, *Epilachna*, which includes among others the Mexican bean beetle and the squash beetle, have evolved a remarkable alternative defense. Instead of the pinching devices, *Epilachna* pupae have a dense covering of tiny glandular hairs, the secretion of which forms a potent deterrent to ants.

You get in touch with chemists, whom you provide with a sample of the secretion, and in due course you find out that you have stumbled upon a unique group of chemicals. The substances include some fascinating new ring structures of enormous size -- so novel, in fact, that the paper you eventually write on the secretion with your colleague chemists attracts wide attention.

The discovery may look serendipitous, but it was not. It was driven by rational inference from pure, old-fashioned natural history, the close observation of organisms -- their origins, their evolution, their behavior, and their relationships with other species. That kind of close, scrupulous observation of nature has a long and illustrious history, but it is now sliding into oblivion.

The scenario we describe actually happened to one of us (Thomas Eisner). The impending extinction of natural history is very real as well. In schools and universities, in government agencies and research foundations, natural history has fallen out of favor. What was once considered a noble field of inquiry -- no less a figure than Charles Darwin proudly called himself a natural historian -- is now viewed as a relict discipline, a holdover from the era of Victorian cabinets and private butterfly collections. A knowledge of, or even an avowed interest in, natural history is no longer a prerequisite for admission to a graduate program in ecology or any other branch of biology. Financial support for basic natural-history research has all but evaporated. Even the field trip, long a staple of science education from the primary grades through graduate school, has become increasingly uncommon.

This deinstitutionalization of natural history looms as one of the biggest scientific mistakes of our time, perpetrated by the very scientists and institutions that depend upon natural history for their well-being. What's at stake is the continued vibrancy of ecology, of animal behavior and botany, of much of molecular biology, and even of medicine and biotechnology. A knowledge of natural history enables the professional ecologist to see functional relationships in nature, to uncover the broader patterns that lead to critical scientific advances. Natural history also provides the "nuts and bolts" information necessary for managing wildlife and other natural resources. As the president of the Society for Conservation Biology recently lamented, "How can we possibly construct ... a successful recovery plan for an endangered bird when we lack basic information on such things as what it eats, where it nests, and so on?"

For the molecular biologist, natural history is often the path to finding something truly strange and wonderful, like the elaborate chemicals that protect the pupae of certain ladybird beetles. Even the search for new medicines can benefit from natural history. Was it not in his capacity as anatural historian that Alexander Fleming saw significance in the observation of a zone of bacterial inhibition around a *Penicillium* mold growing in a petri dish, a discovery that launched the era of antibiotics?

Perhaps the strongest argument in support of natural history is simply the magnitude of our current ignorance about nature. To date, scientists have discovered and described approximately 1.5 million species. That tally represents only a small fraction of the total number, perhaps less than a tenth. Even in the United States, where approximately 200 000 species (terrestrial, freshwater, and marine) have been described to date, an additional 100 000 to 400 000 may await discovery. And only a tiny fraction of the described species have been studied in any detail. Given how little we know about nature, it hardly makes sense to discourage its further exploration.

Several factors have contributed to the demise of natural history. As any field of scientific inquiry matures, it has a tendency to become more theoretical. Previously unconnected observations are brought together under the mantle of a set of unifying principles. Scientists who contribute to that body of theory emerge as the leaders in the field; they are the ones who are hired by research universities, who receive tenure, and who then encourage their graduate students to follow in their footsteps. (This is not to say that one cannot be both a first-rate natural historian and a first-rate theoretician, but such individuals are the exception rather than the rule. Most scientists tend to be strong in one or the other.) No one can blame the universities for wanting to hire the rising stars in each discipline, but with respect to the natural sciences, the practice has led to an unanticipated but regrettable result: The traditional natural historian has been pushed to the margins of academe.

Moreover, the institutions that finance scientific research, be they governmental or private, are drawn to the leaders in any given field and may wrongly assume that the natural historian has comparatively little to contribute. Unable to obtain support for their research, the natural historians drop even lower in the academic pecking order.

(continued on page 4)